Design of distributed energy system through electric system cascade analysis (ESCA)

Abstract

This paper presents a new numerical method called the Electricity System Cascading Analysis (ESCA). ESCA is developed based on pinch analysis principles and useful for designing and optimizing non-intermittent power generator (biomass, biogas, natural gas, diesel, etc.) and energy storage for Distributed Energy Generation (DEG) system. DEG system configuration for this case study comprise of solar Photovoltaic (PV), biomass power generator and Sodium Sulfur (NaS) battery system. Application of the technique on isolated community consisting of 100 houses and daily energy demand of 845 kW h reveals that the power capacity of the biomass power generator is 39.76 kW, NaS battery is 75.8 kW, and the energy capacity of NaS battery is 157.01 kW h.